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AUTHOR Hollingsworth, Patricia L., Ed.
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ABSTRACT

The booklet describes the curriculum of the University of Tulsa School for Gifted Children which serves children from ages 3 to 11. The curriculum is based on Enaction Theory developed by S. Ohlsson as well as other educational models. The introduction presents program goals, summarizes Enaction Theory, notes the important role of content, stresses the University resource, identifies other curriculum strategies, and states the school's values. Following this, the curriculum for each grade level (Early Childhood, Primary I, Primary II, Primary III, Intermediate I, and Intermediate II is outlined; it includes phonics and organic reading/writing at the early levels, daily individual silent reading, language arts, math, social studies and science. The early mathematics curriculum stresses the use of manipulative aids; the science curriculum uses the spiral approach to content; and the social studies curriculum introduces major historical figures and geographical places. At the intermediate level, curriculum additions include cursive writing, spelling, decimals and simple probability, basic algebra, ongoing creative writing, the Junior Great Books Program, American History, and basic chemistry and physics. Taught throughout are the special subjects of computer skills, Spanish, music, and "rainbow day" art. A scope and sequence outline is provided and also included is the text of an article, "Enaction Theory: A Theoretical Validation of the Enrichment Triad Model" by Patricia Hollingsworth. (DB)

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THE UNIVERSITY OF TULSA
SCHOOL FOR GIFTED CHILDREN

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DEVELOPING STUDENT POTENTIAL

- ENHANCING ACADEMIC ACHIEVEMENT
- SOCIAL, EMOTIONAL, & PHYSICAL DEVELOPMENT
- CREATIVE DEVELOPMENT

WORKING WITH PARENTS

- University School Parents' Association
- University School Advisory Board
- Individual Parent and Teacher Conferences

MAXIMIZING THE UNIVERSITY CONNECTION

- Chemistry & Physics Lab
- University Gymnasium
- Foreign Language Lab
- Master's Program
- Campus Field Trips

SERVICE TO THE COMMUNITY

- Conference for Parents & Teachers of the Gifted
- Drama Festival
- Creative Producers' Convention
- Directory of Tulsa Area Schools
- Network News Quarterly

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ENACTION CURRICULUM

BEST COPY AVAILABLE

THE UNIVERSITY SCHOOL ENACTION CURRICULUM

Edited by Patricia L. Hollingsworth, Ed. D.

1988

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THE UNIVERSITY SCHOOL ENACTION CURRICULUM

The University School Enaction Curriculum is designed to meet the special needs of able learners by developing their capacities for thinking and problem solving and providing stimulating and challenging knowledge. The Enaction Curriculum is a curriculum based on Ohlsson's Theory and Glaser's position on domain specific knowledge. Enaction theory postulates that thinking is a matter of running a simulation in one's head. The three steps involved are creating a mental model, manipulating that model, and developing a strategy for problem solving.

PROGRAM GOALS

Our goals are to 1) enhance academic achievement, 2) provide an emotionally supportive, yet intellectually challenging, atmosphere, and 3) develop a creative and positive approach to school and learning.

Enaction Theory

The first step in the Enaction Curriculum is developing the mental model or schema of an object system. In this step, activities are focused on ways to develop the mental model more fully, such as drawing, creating simulations, building models, participating in concept attainment, and reading. The next step involves all the things that could be done to a model. Here activities involve experimenting and manipulating models. The third step focuses on what has been learned that would be useful in future problem solving. Step three involves individual and group evaluation of what was learned, how it was learned, and what might be done to make learning more effective.

The Importance of Content

Coupled with the process-oriented Enaction Theory is an emphasis on thematic content. This content emphasis was selected because research has found that thinking is strongly influenced by experience with new information. It has been found that expert problem solvers are those with conceptual and procedural knowledge in a specific content area. Problem solving, comprehension, and learning are based on knowledge. There can be no problem solving, evaluation or thinking without subject matter, content, or knowledge. Productive thinking, planning, decision making, communication, and forecasting are taught at University School through content areas using the Talents Unlimited model. In addition, students are encouraged to pursue their academic interests with indepth independent study and research projects following the Renzulli Triad model.

The University Connection

Another essential component of the curriculum involves making use of our relationship with the University of Tulsa. The University Connection consist of T.U. Exploration, in which children visit classes, professors, staff, students, and exhibits, and T. U. Input, in which those resources come to

us. Our relationship with the University provides us with numerous unique resources that few schools can match.

Other Curriculum Strategies

The Enaction Curriculum, while providing structure and direction for our curriculum, is flexible enough to encompass a variety of other research based approaches with national and international recognition. We use math and reading teaching strategies that have been shown to be effective in research studies. We use Renzulli's Triad Enrichment approach to children's independent investigations. We use the Talents Unlimited model to develop multiple talents in our children. The Developing Capable Young People approach and classroom meetings are used to teach children to solve their own problems and develop responsibility. We use Math Their Way and Mathematics a Way of Thinking as our math program. These approaches work well with the Enaction Curriculum because they are hands-on, experience based approaches. Our school is unique in its curriculum structure but open enough to use other outstanding approaches which have proven to be effective.

Teachers as Learners

The teachers at University School are involved in on-going learning experiences for personal and professional growth. They attend and participate in professional conferences, workshops, university courses, and in-service staff development. The love of learning is an important attitude that is conveyed by the entire staff.

Curriculum Change, Growth and Revision

The description of curriculum which follows is our most current format; however, all programs are subject to change without prior notice. As we continue to learn, we continue to grow and change. Our curriculum is not static, but dynamic and responsive. The curriculum at University School is constantly being revised to better meet the needs of the students we serve.

Values

While the specifics of our curriculum change, our values do not.

- We want our students to love learning, to love life, and to respect and care for all living things.
- We want our students to value the gifts given them and to share those gifts responsibly with the world.
- For these things to happen, we as teachers and parents must teach and model these values.

Our goal is for teachers, staff, parents and students to strive toward making these values work in our lives.

UNIVERSITY SCHOOL
EARLY CHILDHOOD

Teachers:

Debi Sullivan
University of Oklahoma, B.F.A.,
Art Education
Math Their Way Workshop

Alicia Parent
Oklahoma State University, B.A.,
Early Childhood Education
Math Their Way Workshop

Aide: **Patricia Palmer**

While the Early Childhood curriculum seeks to challenge children intellectually, there is no pressure or push into the academic areas. Teachers are sensitive to the individual development of young children and know appropriate learning experiences for them. The goal of the program is to maximize the social, emotional, physical, and intellectual development of the children. Children are encouraged to be active, independent, and creative learners while also learning to be responsible and cooperative.

LANGUAGE ARTS

Children are encouraged to express and develop their ideas orally during group time through the use of the Talents. Children develop a high level of proficiency in Productive Thinking and Forecasting, which fosters creative and problem solving abilities.

Children are introduced to upper and lower case letters and to their sounds. This is done as a group and on an individual basis through the use of Sound Books.

The children begin the organic method of reading and writing called "Doing Words," which is used throughout the school. Each day children get a word of their choice, which forms the content of reading and writing. This method provides individualized reading and writing material for each child. Children also dictate stories for teachers to write for them.

MATH

Children begin use of Math Their Way materials with free exploration, sorting, and patterning. Children are also introduced to estimation, the number line, graphing, calendar work, recognizing numerals, one-to-one correspondence, and numbers at the concept level. The Math Their Way approach is in keeping with the Enaction Curriculum in that it provides active, hands-on, learning experiences.

SOCIAL STUDIES AND SCIENCE

The combined science and social studies theme for Early Childhood is "Investigating Our World." Units include Becoming Responsible, Working Together, Indians, Textures, Animals, Our Bodies, Magnets, Seasons, Nature and Environment, Opposites, Colors, and Solids and Liquids. Students are encouraged to observe, describe, compare, and classify.

INDEPENDENT AND REQUIRED WORK

Each week children have a list of required work, called "Must Do Work," that they are to complete. Children choose when they will complete the work, but it must be done by the end of the week. There is ample time for selection of independent work in addition to "Must Do Work." The independent work options include a wide variety of arts and crafts, sand and watertable materials, block building, other manipulatives, games, and books. Children develop a responsible approach to work in that they learn to carry out some teacher-directed activities, but also remain self-directed when appropriate.

SPECIAL SUBJECTS

Children also take computer, music, art, and Spanish. For a description of those courses, refer to the SPECIAL SUBJECTS section following the CLASS LEVEL section.

UNIVERSITY SCHOOL
PRIMARY I

Teachers:

Dr. Pat Hollingsworth
Florida State University, B.S.,
Education
University of Tulsa, M.T.A.,
Art Education
University of Tulsa, Ed. D.,
Educational Administration
Graduate Work:
George Washington University
University of Florida
University of Oregon
SOI Institute Workshops, Advanced Trainer
Post-Graduate Work with Renzulli,
University of Connecticut

Keith Ann Brant
Oklahoma City University, B.A.
Early Childhood Education
Certified Montessori Teacher

Lucille Kelly
Former YWCA Educational Administrator

LANGUAGE ARTS

Phonics

The content of the Primary I curriculum is thematically focused on the Letter of the Week. Each week a specific letter of the alphabet is selected for study. That study includes the sound of the letter, vocabulary words that begin with the letter, science and social studies topics that begin with the letter, and writing of the letter. During the first semester, the easiest and most common consonants plus the short vowels are studied. During the second semester, the less common consonants, blend sounds, and long vowels are studied. Each day students are individually evaluated to discern the level of phonetic attainment.

Organic Reading and Writing

Primary I builds on the skills developed in Early Childhood in organic reading and writing. Students begin the school year by getting a new word each day of their own choosing. These words form the basis of the writing and reading done in class each day. When the student is both reading and writing the words with ease, sentence writing is introduced. By the end of the year, students are writing stories each day using their own personal dictionaries. The important thing about this method of reading and writing is that the content is meaningful and motivating because it comes directly from the children and their experiences. The handwriting method is D'Nealian, which is used throughout the school.

MATH

Math Their Way is a concrete, hands-on method of teaching number skills. The method provides a variety of three-dimensional materials that are used to teach counting, addition, and subtraction. Children are assessed to determine their entry level and then periodically assessed throughout the

year. A wide variety of other math manipulatives, such as geoboards, patterning materials, centimeter cubes, and math games are also available in the math area.

SCIENCE

The Primary I Science Curriculum is based on the modified spiral pattern used throughout the school. The theme is "Dividing the World: Investigating the Living and Non-Living." Topics to be introduced are: Insects, Birds, Reptiles, Amphibians, Mammals, Botany, and Actions and Reactions of Water and Air. Students are encouraged to become actively involved in collecting information, experimenting, and drawing conclusions.

SOCIAL STUDIES

The Primary I Social Studies theme is "Ourselves and Others," which involves comparing our lives with those of others, both past and present.

History

Students are introduced to a variety of historical figures, the majority of which are related to holidays that we celebrate. The lessons begin with stories, films, songs, and pictures about the event and move to the children themselves reenacting the historical event. Often these dramas are produced for parents and other students, but some are performed just for the class itself. People or events that are introduced are Columbus, the Pilgrims, George Washington, Martin Luther King, Abraham Lincoln, Queen Victoria, Queen Elizabeth I, King Henry VIII, and the Oklahoma Land Run.

Geography

The people and events studied are a natural lead into the study of other countries. Students begin by learning the location of Spain and Italy during the study of Columbus. By the end of the school year most of the students can locate all of the continents. Young children have a great curiosity about our world and enjoy learning about maps and globes. The following are included in our studies: Italy, Spain, Japan, China, Ireland, Asia, United States, Oklahoma, and Egypt.

WORK AREAS

Each morning students work with a teacher in the Math Area, the Language Arts Area, and a combined Science and Social Studies Area. When students are not working directly with a teacher they are free to make choices of work in the Independent Work Area. The Independent Work Area is comprised of the Dramatic Play Area, the art easel, the science table, plus a variety of art materials and manipulatives.

SPECIAL SUBJECTS

Students also take computer, music, art, Spanish, and participate in Talent development. For a description of those courses refer to the section called SPECIAL SUBJECTS following the CLASS LEVEL descriptions.

UNIVERSITY SCHOOL
PRIMARY II

Teacher:
Suzanne Pancake
Marshall University, B.A. Elementary Education/Early Childhood

Assistant Teacher:
Julie Nierenberg
Earlham College, B.A. Biology
University of Tulsa, M.A. in Gifted in Progress

The curriculum in Primary II builds upon the basic skills and foundations initiated in Early Childhood and Primary I. Reading, mathematics, handwriting, social studies, and science are taught on a group or individualized basis depending on which is the most effective for the particular learning experience.

LANGUAGE ARTS

Oral reading in small groups occurs daily. Children are taught the phonetic approach to decoding words. Contractions, prefixes, and suffixes are introduced and students work for mastery of the Dolch Sight Words. Correct punctuation is reviewed and expanded both in reading groups and in "Doing Words." Reading, writing and handwriting skills continue to be integrated in this organic reading and writing approach. Primary II students continue writing stories each day using their own personal dictionaries. The Writers' Conference is introduced, in which small groups of students work on editing and revising stories written in class that week. Silent reading for enjoyment is encouraged. Students continue to work for mastery of the D'Nealian Handwriting System. The system is used throughout the school.

MATH

Math in Primary II incorporates Math Their Way approaches with Addison-Wesley Mathematics. Student learn addition and subtraction facts to 24, and counting to 250. Students learn to use the number line and to form numbers correctly. A variety of math manipulatives are used to make the learning of concepts meaningful.

SCIENCE

The Primary II science theme is "Investigating Changes Around Us." Topics included are: Magnetism, Behavior or Matter: Liquids, Solids & Gases, Animal Hibernation, and Soil and Plant Growth. The purpose of Primary II science is to develop inquiry skills needed for scientific investigation.

SOCIAL STUDIES

"Living Together at Home and at School" is the Primary II Social Studies theme. The focus of all the University School Enaction Curriculum Social Studies units is the importance of building an interdependent community that respects both freedom and cooperation.

SPECIAL SUBJECTS

Students also take music, Spanish, computer, art, and work with the Talents. Please refer to the SPECIAL SUBJECTS section for a description.

UNIVERSITY SCHOOL
PRIMARY III

Teacher:
Stephanie Sisler
Baylor University, B.A. Education
University of Tulsa, M.A. in progress

Assistant Teacher:
Mary Grewe
Colorado College, B.A. English
University of Tulsa, M.A. in Gifted in Progress

LANGUAGE ARTS

In addition to small group oral reading instruction, there is daily individual silent reading. Students learn methods of decoding and a taxonomy for developing comprehension. The Houghton Mifflin reading series is used for Primary III.

Students read and write each day using the organic reading and writing method called "Doing Words." The content of the writing comes from the student, making it personal and individualized. The teacher helps the student correct any spelling or punctuation errors as they occur. Each week, Writers' Conferences are held with the teacher and a small group of students to improve, clarify, and revise written work. This integrated method of reading, writing, and handwriting is used throughtout the school. D'Nealian handwriting skills are continued and reinforced.

MATH

Concepts and foundations developed through Math Their Way and the Addison-Wesley Mathmatics series are continued. Students strengthen addition and subtraction skills and begin the use of regrouping. Students continue working on multiplication facts, fractions, estimation, measurement, patterning, money, and time. Students will work with story problems that will relate to their unit on economic and consumer education.

SCIENCE

Science for Primary III will focus on the theme "The Chain of Life: Investigating Life Cycles." Elements from biology, ecology, botany, and ornithology are included. An extensive science-related vocabulary is introduced and students are encouraged to be actively involved in science investigations. A science and social studies timeline is part of an on-going classroom project.

SOCIAL STUDIES

The social studies theme for Primary III is "Interdependence of Communities and Regions in the U.S." Economic and consumer education, U.S. geographic land forms, U.S. forms of government, and major U.S. historical events are part of the Primary III curriculum.

SPECIAL SUBJECTS

Students also take Spanish, computer, music, art, and work with Talent development. Refer to the SPECIAL SUBJECTS section for descriptions

UNIVERSITY SCHOOL
INTERMEDIATE I

Teacher:

Lee-Ann Short
Arizona State University, B.A. Education
Graduate work: Colorado State University
Western State College
Northeastern State University
Math Their Way Workshop

LANGUAGE ARTS

Reading

The reading program uses material from basal readers as well as other literature sources to provide varied subjects, levels, and types of reading. Activities build on previously acquired skills in phonetic analysis, comprehension development, and higher level thinking skills. Skills needed for reading in the content areas are emphasized.

Spelling

The spelling program provides a systematic approach to sound-spelling relationships based on patterns or structure of words. Group instruction is used to introduce spelling patterns and structure; however, students will have individual spelling lists. Vocabulary building is an important part of spelling and is emphasized in Intermediate I.

Writing

The continuation of the organic method of reading and writing, "Doing Words," provides reinforcement of grammar and punctuation skills on an individual basis. Both oral and written reports provide extended practice for correct language usage. Students continue to master D'Nealian manuscript and begin D'Nealian cursive as they demonstrate readiness. Weekly Writers' Conferences continue to help students learn to clarify and revise their written work.

MATH

Math Their Way, Mathematics a Way of Thinking, and the Addison-Wesley Mathematics series form the basis of the Intermediate I Math Curriculum. Students work on maintaining and developing computation skills in addition, subtraction, multiplication, and division. Work on time, estimation, measurement, money, geometry, and graphing continue. Students are introduced to decimals and simple probability.

SCIENCE

The science theme for Intermediate I is "Ourselves and Other Animals: Investigating Body Systems." The primary focus is on comparing human body systems with other animals. Mrs. Block will be working with Mrs. Short in the teaching of science.

SOCIAL STUDIES

The social studies theme, "The interdependence of Communities and Regions of the World," looks at how land forms influence climate, economics, and culture. Students are introduced to the history, geography, and culture of the seven continents, including states and Presidents of the United States. The aim of this course is for students to begin to understand global interdependence.

SPECIAL SUBJECTS

Students also take art, music, computer, Spanish and learn to use the Talents. Please refer to the SPECIAL SUBJECTS section for a description.

UNIVERSITY SCHOOL
INTERMEDIATE II: Math and Language Arts

Teacher:

S.G. (Trixy) Barnes
Baylor University, B.A. Education
Oklahoma State University, M.S. Education in progress
Math Their Way Workshop
Mathematics A Way of Thinking Workshop
Gesell Institute Workshop

MATH

Basic math concepts and facts are introduced and reinforced through a structured and logical progession of skills based on the Addison-Wesley Math Series for 2nd through 8th grade general mathematics and 9th grade algebra, and the discovery of mathematics through manipulatives based on Math Their Way and Mathematics A Way of Thinking.

Daily, weekly, and monthly reviews help maintain previously acquired concepts and skills. Knowledge of basic math facts is reinforced through weekly time tests.

Mathematical enrichment is provided through the exploration and study of:

1) tessellations
2) factorials
3) prime numbers
4) factorization
5) scientific notation
6) mathematical patterns
7) pentominoes
8) logic problems
9) tanagrams
10) probability
11) math in nature
12) Fibonacci sequencing
13) the history of mathematics
14) mathematics of the electoral college

Algebra I, Expressions, Equations, and Applications by Paul A. Foerster, Addison Wesley, Menlo Park, California, 1984.

Addison Wesley Mathematics by Robert E. eicholz, Phares G. O'Doffer, and Charles R. Fleenor Menlo Park, California, 1987.

Math Their Way

Mathematics A Way of Thinking by Robert Baratta-Lorton, Addison Wesley, Menlo Park, California, 1977.

LANGUAGE ARTS

Creative Writing

The student's creative expressions in poetry and prose are used as a basis for individualized teaching of spelling, editing, handwriting, vocabulary, and language arts.

When the final copy of the student's work is bound into book form they are encouraged to share their works with classmates as well as younger classes. This sharing provides reinforcement of oral reading skills and leads to the development of a positive self-concept. Each year "The Young Authors' Conference" provides an evening for students to share their books with family and friends. Students are given the opportunity to read selections from their favorite books.

Reading

Basic reading, decoding, and analytical thinking skills are taught and reinforced through silent and oral reading, followed by small group discussion.

The core material consists of outstanding works of children's literature and a basal reading progam.

The basal program draws heavily from major works of English-American literature and the writings of renowned current and historical people, as it provides for basic reading instruction while laying the framework for a strong foundation of cultural literacy.

Texts Used:

RISE Program Reading Series:

- What Joy Awaits You
- But Life Is Calling You
- Awake to World Unfolding

Published by Open Court Publishing Company, 1977.

UNIVERSITY SCHOOL
INTERMEDIATE II: Language Arts and Social Studies

Teacher:

Kathy Horne
Wellesley College, B.A., Economics
Bank Street College, M.S., Education
University of Oklahoma, Masters in Library Science in progress
Trained Junior Great Books Leader, Great Books Foundation

LANGUAGE ARTS

Great Books

The Junior Great Books Program is a twelve week program in which students read one selection at home and come to class prepared for discussion. Students are grouped for discussion by age and read the book of selections published by the Great Books Foundation that most closely corresponds to their age.

Junior Great Books differs from other programs and methods in its approach to reading because it teaches students to formulate and ask questions as well as to answer them. They learn to read interpretively and to think reflectively. During the discussions they are encouraged to try out explanations of the meaning of a piece. Students are also encouraged to discuss what genuinely puzzles them in what they read. Participation in this program cultivates the skills of reading, speaking, and listening.

Journal Writing

Once a week students write short paragraphs in their own journals. During the same class period, they share their entries with the group and an editing session follows. Students learn:

-to organize ideas effectively
-to express thoughts clearly
-to expand vocabulary with which to express thoughts
-language skills such as sentences, punctuation, capitalization, parts of speech, and choice of word forms
-handwriting

Library/Resource Room

The goal of the library curriculum is to help students become successful independent learners.

Through weekly assignments and an independent research project, students reinforce all previous concepts as well as develop new skills.

- o Students learn to find a variety of information sources within our school as well as the community.
- o Students develop abilities to sort and use information in the following formats:
  - -Print materials (books, magazines, newspapers, pamphlets, etc.)
  - -Nonprint materials (pictures, filmstrips, films, video-cassettes, human resources, etc.)
- o Students develop skills to classify and arrange information after it has been located and interpreted.
- o Students learn to communicate information in various formats.
- o Students learn to enjoy a wide variety of literature..

SOCIAL STUDIES

History and Geography

The election of our 41st president provides the students the opportunity to study the electoral process of today, as well as the election of U.S. Presidents throughout our history. American History is studied through the reading of biographies, historical fiction, and a variety of reference and non-fiction sources.

To more fully understand America's past, students need to have a basic knowledge of its geography. Students build upon and develop their skills in reading maps and globes, as well as their knowledge of land forms, climate, land uses, and products.

Students have common readings and individual assignments. Periodically they share what they have learned in seminars. The new social studies textbooks provide an excellent resource for this class.

Materials used:

Our History, Holt, Rinehart, and Winston.

Scholastic News

Scholastic series: Success With Maps

Cheyney, Arnold B. & Donald L. Capone. The Map Corner

World Book of America's Presidents

UNIVERSITY SCHOOL
INTERMEDIATE II: Science

Teacher:

Sharon Block
University of South Dakota, A.A., R.N.
Morningside College, B.S. , Psychology
Former Education Outreach Lecturer for the Margaret Hudson Program

Science for Intermediate II students has three core components: Physics, Chemistry, and General Science. Physics and Chemistry are taught by T.U. professors. The Intermediate II general science theme, "On Planet Earth: Investigating Earth Systems," is part of the modified spiral curriculum plan for University School science. Studies have shown that any topic of science can be taught at any grade level. However it is not possible to teach every science topic every year. The modified spiral plan provides for topics to be introduced and later reintroduced to help insure the development of concepts, knowledge, skills, and maintenance of those.

The purpose of the science curriculum is to stimulate observation and curiosity while developing scientific inquiry skills. The course provides a balance between fact-acquisition and problem solving.

Experimentation and hands-on learning are stressed.

During all units the importance of accurate data record keeping is emphasized. In both chemistry and physics, students have lab records to maintain. Older students are required to write reports of more depth and complexity than younger students.

The following units will be included:

1) Sky, Seasons, and Weather, which will involve acid rain collection and pollen counts
2) Movement, Forces, and Machines
3) Electricity and Magnetism
4) Ecology
5) Geology
6) History of Famous Scientists

UNIVERSITY SCHOOL
INTERMEDIATE II: Physical Education and Grammar

Teacher:

Jim Dowell
University of Kansas, B.A. , English
University of Tulsa, M.T.A., English in progress

PHYSICAL EDUCATION

The course endeavors to improve both individual skill levels in basic movements (The Presidential Fitness Events) and teamwork (volley ball, basketball, softball, etc.). Physical education classes offer an excellent opportunity to develop social skills, leadership, and conflict resolution. The major objectives of the course are to provide the student with the experience of the enjoyment of developing his or her physical potential, to develop specific skill competencies, and to enable the student to function well in a group situation.

GRAMMAR

The grammar course consists of a once a week class taught from a lingusitic perspective. The content is derived from Herbert Kohl's "puzzlements" (grammar games) and Chomsky's tree structure diagrams (simple forms only). The objective of the course is to develop a conscious understanding of the unconscious mastery of grammar that every child posseses. A broader goal is to develop an appreciation for the wonder, majesty, and mystery of our everyday use of language.

SPECIAL SUBJECTS

Intermediate II students also take music, art, computer, Spanish, and talent development. Please refer to SPECIAL SUBJECTS section for descriptions.

UNIVERSITY SCHOOL
SPECIAL SUBJECTS: Computers

Teacher:

Marilyn Howard
University of Tulsa, B.S., Mathematics
Indiana University, M.A. , Mathematics
Programmer/Analyst , IU, Boeing Computer Services and Univ. of Texas, Permian Basin, 1972-1982
Math Their Way Workshop

Hardware:

12 IBM PcJrs., 2 Apple II GS, and 1 Macintosh SE with a 1 meg harddisk, AT Clone with a 20 meg harddisk and internal modem for data logging

EARLY CHILDHOOD and PRIMARY I COMPUTER

The goal for children at this level is a positive learning experience with the computer. A variety of educational programs helps familiarize the students with the keyboard, and develop math and reading readiness skills.

The instant version of LOGO, a list processing language, is introduced. A triangular shape called the turtle is used to draw pictures using the following commands:

C	CLEARSCREEN
F	FORWARD 10
B	BACK 10
R	RIGHT 90
L	LEFT 90
H	HIDE TURTLE
S	SHOW TURTLE

PRIMARY II AND PRIMARY III COMPUTER

At this level, the children recognize the computer needs instruction. They can follow a procedure for a familiar task, and can modify a procedure or find and correct errors in a procedure. Basic computer vocabulary and computer applications are introduced. Students begin to learn the full LOGO commands such as:

FORWARD 10
RIGHT 90
CLEARSCREEN
etc.

They use LOGO to write simple procedures.

INTERMEDIATE I AND II COMPUTER

Students practice correct keyboarding techniques and learn to use the following tools:

Word Processor
Database Manager
Graphing Assistant
Spreadsheet
Modem

They build on what they have learned in LOGO, developing procedures involving repetition, decision making, and variables.

The students learn to program in BASIC utilizing FOR-NEXT loops, IF-THEN statements and variables. Using what they have learned, the students modify existing programs and write their own programs.

In addition, they begin to learn about the internal workings of the computer. Students learn the binary number system and build a database of computer vocabulary.

The students use a variety of educational software including:

Drill and practice programs
Simulations
Computer Aided Instruction (CAI)
Problem solving programs
Adventure games

UNIVERSITY SCHOOL
SPECIAL SUBJECTS: Spanish

Teacher:

Maureen Burke
University of Tulsa, B.A., Spanish
Studied in Spain and Mexico

EARLY CHILDHOOD AND PRIMARY I SPANISH

During the school year children build a basic vocabulary in Spanish by learning greetings, numbers, colors, and the Spanish alphabet. Games, rhymes, and songs are introduced to reinforce prior learning and to make Spanish interesting and enjoyable. It is important for children to be introduced to a foreign language at a young age. Young children acquire a second language with fewer of the diction and pronunciation problems of older learners.

PRIMARY II AND PRIMARY III SPANISH

The students build on previously learned vocabulary by orally answering and asking questions in complete sentences in Spanish. They participate in spontaneous and memorized Spanish dialogues. Students play games, learn rhymes, and sing songs in Spanish, as well as, learn a variety of aspects about Spanish and Hispanic culture. The children attend the University of Tulsa Foreign Language Lab to listen to songs, rhymes, vocabulary words, and dialogues in Spanish. The goal for the children at this level is extensive development of listening and speaking skills in Spanish. The text used is Hablan los Ninos by Dorothy Sword Bishop.

INTERMEDIATE I SPANISH

Building on the vocabulary previously acquired in Spanish, the students use the textbook, Let's Speak Spanish, to improve listening and speaking skills. The text is the first in a series of four sequential books used at University School. The first book has no words, only pictures, which helps the students associate the sound of the language with its meaning. Pronunciation, vocabulary structure, and conversational skills are introduced. Quizzes are given at the end of each lesson to assess comprehension. A variety of cultural aspects of Spanish-speaking peoples, such as history, arts, songs, rhymes, and games are studied. Students attend the University of Tulsa Foreign Language Lab approx-imately twice a month.

INTERMEDIATE II SPANISH

The text, Mi Primera Fonetica, is used to review and develop Spanish phonetic skills. Additionally, students use the textbook, Ya Se Leer, to learn to read in Spanish. A workbook that accompanies the text is used to reinforce and develop grammar skills. Quizzes are given after each lesson to assess comprehension. Classwork involves dramatizing dialogues, learning rhymes, songs and poems, and watching Spanish videotapes. The history and culture of Spanish speaking people will also be studied. Students continue to attend the Language Lab.

UNIVERSITY SCHOOL
SPECIAL SUBJECTS: General Music

Teacher:

Betty Mitchell
Southwest Missouri State University, B.S., Music Education
Studied Kodaly and Orft Music methods:

Westminster Choir College	George Washington University
University of Maryland	John Hopkins University
Newark State College	Michigan State University

GENERAL MUSIC

General Music is a course intended to provide a variety of sequentially arranged activities (singing, playing instruments, moving, creating, listening, reading, and writing) through which students may acquire concepts of rhythm, melody, harmony and texture, form and timbre. The Kodaly method of music education is used to teach students to sight read using solfege and hand signs. Students study a wide variety of musical styles but the core of the music curriculum is American folk music.

The Orff method of music education, which combines singing, movement, speech, and the playing of instruments, is used to teach improvisation and encourage musical sensitivity. All the musical materials used are of high quality. Much of the music is American folk music or folk music of other countries. Other material is music written especially for children.

Course Goals:

1) Students will demonstrate understanding of musical concepts by performing, reading, writing, analyzing, and creating.
2) Students will study melodic and rhythmic concepts in sequences of difficulty.
3) Students will demonstrate performance skills both individually and as part of an ensemble.
4) Students will build a vocabulary of musical terms and symbols which will increase with each successive year.
5) Students will demonstrate the social skills necessary to work with other students toward achieving musical goals.

Course Texts:

- The Kodaly Method by Lois Choksy. Prentice Hall, Inc. Englewood Cliffs, New Jersey
- 150 American Folk Songs by Peter Erdri. Boosey and Hawks, New York, New York.
- Listen, Look, and Sing, Vol. I, II, and III by Aden G. Lewis. Silver Burdett Company, Morristown, New Jersey.
- Orff-Schulwerk Music for Children by Carl Orff and Gunild Keetman. Adapted by Margaret Murray. Schott and Company, Ltd. London, England.
- Music for Children, Orff-Schulwerk American Edition, Schott Music Corporation.

Many other musical materials are also used in general music.

UNIVERSITY SCHOOL
SPECIAL SUBJECTS: Rainbow Day Art

Teacher: **Dr. Patricia Hollingsworth**

RAINBOW DAY ART

The art curriculum attempts to fulfill the purposes of University School by developing the creative, academic, and social/emotional potential of students.

The goals of the program are:
1) for students to learn to creatively express their ideas and feelings visually
2) for students to learn to respond to a wide variety of artistic periods and styles
3) for students to learn ways art has been expressed over time
4) for students to learn to make reasoned judgments about art based on appropriate criteria

EARLY CHILDHOOD ART

Art at this level is taught by the classroom teacher, Debi Sullivan. Emphasis is placed on developing creative self-expression while learning correct methods of caring for materials and equipment.

PRIMARY I ART

For students in Primary I the main focus is a balance between personal expression and learning to observe. Topics for painting and drawing during the teacher-directed instruction time relate to the topics of study in class and are teacher selected. The way in which the child interprets topics and observations is personal. During independent work time both materials and topics are student choices. Topics include insects, reptiles, amphibians, birds, mammals, and plants. Students observe and draw from living objects as often as possible with personal interpretation continually being valued and encouraged.

PRIMARY II AND PRIMARY III ART

Students continue to draw and paint from observing living objects and interpretating them in their own way. In addition to plant and animal life for topics, students begin drawing man-made objects from life, such as buildings and machinery. The drawing of the human body is continued and developed. Students are introduced to artists that relate to the topics being studied and are introduced to art history through the Human Time Line. The text , Smart Art, introduces students to art theories and art criticism.

INTERMEDIATE I AND INTERMEDIATE II ART

Because of their more advanced developmental level, Intermediate students begin working on more long-term projects, such as painting and printmaking. Additional emphasis is placed on drawing from observation with personal interpretation. Students are introduced to calligraphy, perspective, and art history. Smart Art develops the concepts of art criticism and art theories.

Text: Smart Art by Dr. Pat Hollingsworth and Stephen Hollingsworth. Zephyr Press.

UNIVERSITY SCHOOL
SPECIAL SUBJECTS: Developing Multiple Talents

DEVELOPING THE TALENTS

The development of multiple talents is a high priority at University School. The model used throughout the school is Talents Unlimited, based on Calvin Taylor's research and developed by Carol Schlichter. The talents of 1) Productive Thinking, 2) Planning, 3) Communication, 4) Decision Making, and 5) Forecasting, are taught within the context of the academics. For example, to teach productive thinking in math, students might be asked to think of the many, varied, and and unusual ways that fractions can be used. To teach planning in social studies, students might be asked to plan the cargo that Columbus should have carried with him. Each one of the Talents has specific steps to be learned and is always taught within academic content.

UNIVERSITY SCHOOL
SCOPE AND SEQUENCE:
Language Arts, Math, Etc.

LANGUAGE ARTS	EC	PRI.I	PRI.II	PRI.III	INT.I	INT.II
D'Nealian Handwriting Manuscript	X	X	X	X	X	X
D'Nealian Handwriting Cursive				X	X	X
Organic Reading and Writing						
Words	X	X				
Sentences	X	X	X			
Paragraphs		X	X	X	X	X
Dictionaries			X	X	X	X
Writer's Conference				X	X	X
Basal Readers			X	X	X	X
Creative Writing	X	X	X	X	X	X
Linguistics						X
MATH						
Math Their Way	X	X	X	X	X	X
Mathematics a Way of Thinking				X	X	X
Addison-Wesley Mathematics			X	X	X	X
TALENTS						
Productive Thinking	X	X	X	X	X	X
Forecasting	X	X	X	X	X	X
Planning		X	X	X	X	X
Communication		X	X	X	X	X
Decision Making			X	X	X	X
SOI MATERIAL					X	X

ENRICHMENT TRIAD						
Type I Exploration Activities	X	X	X	X	X	X
Type II Training Activities	X	X	X	X	X	X
Type II.5 Beginning Independent Studies				X	X	X
Type III Investigations of Real Problems for Real Audiences					X	X
MUSIC	X	X	X	X	X	X
COMPUTER	X	X	X	X	X	X
SPANISH	X	X	X	X	X	X
ART	X	X	X	X	X	X
PHYSICAL EDUCATION						
Informal Activities	X	X	X	X	X	X
Formal Instruction					X	X

UNIVERSITY SCHOOL
SCOPE AND SEQUENCE:
Social Studies and Science

	SOCIAL STUDIES FOCUS: INTERDEPENDENCE	SCIENCE FOCUS: INVESTIGATION
EC	"Investigating Our World" -Combined Social studies and Science -Responsibility and Cooperation -Using the Talents -Oviperous Animals -Fish	
PRI I	"Ourselves and Others" -History of Holidays -Life in Other Countries	"Dividing Our World: Investigating the Living and Non-Living" -Interdependence of the Living and the Non-Living -Animals: Insects, Reptiles, Birds, Amphibians, Mammals -Water: Floating, Rust, Growing Crystals -Plants: Flowers, Roots, Stems
PRI II	"Living Together at Home and School" -Rules and Manners -Problem Solving -Cooperation -Review of Holiday History	"Investigating Changes Around Us" -Magnetism & Electricity -Behavior of Matter: Solids, Liquids, and Gases -Animal Hibernation -Soil and Plant Growth
PRI III	"Interdependence of Communities and Regions in the U.S." -Economic and Consumer Education -Form of government -Major U.S. Historical events	"The Chain of Life: Investigating Life Cycles" -Animal and Plant Life Cycles draws on elements from Biology, Ecology, Botany, and Ornithology

	SOCIAL STUDIES FOCUS: INTERDEPENDENCE	SCIENCE FOCUS: INVESTIGATION
INT I	"Interdependence of Communities and Regions of the World" -Land forms influence on climate, economics and culture -Global perspective of Interdependence -Study of states and Presidents of U.S. -Major World History Events	"Ourselves and Other Animals: Investigating Body Systems" -Comparing human body systems with other animals
INT II	"The Electoral Process: Past and Present" -Process of the election of our 41st president -Reading of biographies, historical fiction and non-fiction -Land forms, climate, land use products -Maps and Globes	"On Planet Earth: Investigating Earth Systems" -Sky, Seasons, Weather -Movement, Forces & Machines -Magnetism and Electricity -Ecology -History of Famous Scientists

Enaction Theory: A Theoretical Validation of the Enrichment Triad Model

Patricia L. Hollingsworth

Enaction Theory postulates that thinking occurs when an internal mental model undergoes mental manipulations with the guidance of heuristics. The purpose of this paper is to show similarities and relationships between Enaction Theory and the Enrichment Triad Model that seem to lend theoretical validity to Triad in terms of facilitating reflective thinking or problem solving.

Patricia L. Hollingsworth *(Ed.D.), is the Director of the University of Tulsa School for Gifted Children in Tulsa, Oklahoma. She is a professional writer and artist who has presented workshops on parenting and the arts both locally and nationally.*

Figure 1
Relationships between Enaction Theory & Enrichment Triad

TYPE I's develop the MENTAL MODEL
A REPRESENTATIONAL MENTAL MODEL IS DEVELOPED.
SCHEMA OR MODEL ENCODING
TYPE I: OCEANOGRAPHY
TYPE II'S and OPERATORS help in making predictions.
TYPE II: OCEANOGRAPHY
Productive Thinking
Forecasting
Decision Making
Polluting our oceans is dangerous.
AN OPERATOR IS A MENTAL PROCEDURE INVOLVING A SET OF ACTIONS ON THE MODEL
TYPE III's and HEURISTICS tie together SITUATIONS, GOALS, & ACTIONS.
SELECTING OPERATORS TO RUN THROUGH THE MENTAL MODEL
A HEURISTIC IS A RULE OR STRATEGY FOR PROBLEM SOLVING — for selecting OPERATORS
I'm concerned about tidal pool pollution.
SITUATION
I want other to know about the problem.
GOAL
I might write a newspaper article about the problem
ACTION

Enaction Theory of Thinking (Ohlsson, 1983) postulates that thinking is a matter of running a simulation of the world through one's head. This simulation occurs as a representational mental model undergoes mental manipulations under the guidance of heuristics. Extensive research by Newell and Simon (1972) provides the basis of Enaction Theory. Thinking in this model, as in psychological theory and research (Bolton, 1972), will be closely identified with problem solving. John Dewey's (1933) similar concept, reflective thinking, refers to thinking that involves "turning a subject over in the mind and giving it serious and consecutive consideration" (p.3).

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The purpose of this paper is to show ways in which the Enrichment Triad Model (Renzulli, 1977) appears to facilitate thinking or problem solving according to the Enaction Theory of Thinking. This paper will deal with relationships and similarities between Enaction Theory and the Enrichment Triad Model that seem to lend theoretical validity to the Triad Model.

The Enrichment Triad, a widely used model in gifted education, was designed to provide an enrichment program for highly able youth. The Enrichment Triad consists of Type I Enrichment activities, which are general exploratory experiences; Type II Enrichment activities, which are group and individual training activities designed to develop higher level thinking processes, research and reference skills, and personal and social development; and Type III Enrichment activities, which involve individual and small group investigations of real problems that are presented to appropriate audiences.

Mental Models and Type I Enrichment

The first stage in Enaction Theory is the development of a mental representation, model, or schema that can be defined as an abstract cognitive model of a concept with a network of interactions similar to the major elements of the object system (Rumelhart, 1977). A mental representation is not necessarily a visual image but rather a model that is in some functional ways like the object system which it represents. Ohlsson (1983) says that our internal conceptions are more like formulas, holograms, musical scores, drawings or paintings than they are like texts in books. Our encoded mental models do not seem to be propositional like words in a book. Research by Dean and Kulhavy (1981) and Mastropieri and Scruggs (1984) supports Enaction Theory's contention that much information is encoded non-propositionally.

In Type I Enrichment, students are exposed to a spectrum of new ideas, topics, and fields of knowledge not ordinarily covered in the regular curriculum, in the form of speakers, field trips, media presentations, and interest development centers (Renzulli, 1984). For example, and oceanographer might give a presentation to an elementary school on marine ecosystems.

Students involved in the Type I experience on marine ecosystems begin to develop a rudimentary internal mental model of how plants and animals live together in oceans. Enaction Theory indicates that high personal involvement with objects systems facilitates the development of a representational mental model. Type I experiences often provide professionally trained persons to present hands-on, highly involving materials to get students excited about new knowledge (Reis, Atamian, & Renzulli, 1985). Because Type I experiences are usually with working professionals in the field, the information gained is more likely to be accurate, current, enthusiastic, and involving the tools and materials of the trade. All of these elements contribute to the development of an accurate, useful mental representation. In order to develop a mental model, one must discover the relevant aspects of the object system in the world (Johnson-Laird, 1980). Type I experiences provide opportunities for students to learn in both propositional and non-propositional ways. For example, a unit on astronomy began with a lecture, an observational experience, and use of a telescope (Reis, Atamian, & Renzulli, 1985). Students in Type I Enrichment are involved in gaining knowledge experientially and are thus more likely to grasp and encode the relevant aspects of an object system. Type I Enrichment seems to be fertile ground for the encoding of a mental model.

Operators and Type II Enrichment

According to Enaction Theory, every object system has a set of actions that can be performed upon it. One's mental model undergoes changes just as the object system in the external world undergoes changes. These mental changes, operators, allow a person to predict an outcome. For example, a houseplant can be watered, fertilized, sprayed for insects, transplanted, transported, dropped, neglected, pruned, etc. Each of these actions is mirrored internally by a mental procedure or operator. By applying an operator, a person can think ahead to what the plant will be like if it is not watered. The person will be able to predict that lack of water will cause the plant to die.

A model and a set of operators are a system that can be run by a succession of the operators. A thought process could be described as a mental model passing through a sequence of accumulating changes. The changes are analogous to the changes that can actually occur to the object system in the world. An operator contains process or procedural knowledge, while a model contains representational knowledge. Dewey (1933) seemed to have the concept of operators in mind when he wrote "in any reflective thought definite units... are linked together so that there is a sustained movement to a common end" (p.5).

Type II experiences are methods and materials designed to develop a broad range of thinking and feeling processes (Renzulli & Reis, 1985). There are four parts to the Taxonomy of Type II Enrichment Processes: (a) Cognitive and Affective Training; (b) Learning How-to-Learn Skills; (c) Using Advanced Research and Reference Materials; and (d) Developing Written, Oral, and Visual Communication Techniques (Renzulli & Reis, 1986). In the previously mentioned unit on astronomy (Reis, Atamian, & Renzulli, 1985) the Type II training involved observing the night sky and keeping records of objects and events for a period of three months. Students were observing changes in the physical world and, according to Enaction Theory, were mirroring those changes internally. In other words, students were developing operators with which they can predict outcomes related to the object system, in this case, astronomy. Another example of Type II training was designed to increase syntactic maturity and creativity of students' writing (Stoddard & Renzulli, 1983). In this case, the students were learning the procedures for writing in a more mature and creative way. Ohlsson (1983) stresses the importance of emphasizing the procedural aspects of all kinds of content. Talents Unlimited (Schlichter, 1981), which can be used as Type II training, teaches students the procedures for planning, forecasting, communication, productive thinking, and decision making within any academic area. For example, if students had participated in a Type I on marine ecology, the group might use the productive thinking procedure to discuss the many, varied, and unusual things that live in oceans. Later, students might be asked to use their forecasting talents to tell what might happen if we pollute our tidal pools. Or students might focus on a particular problem in marine ecology by using the decision making procedure. When the problem becomes focused, the teacher can help students identify and locate materials and resources that will develop process skills related to the problem (Reis & Renzulli, 1985).

It is fairly easy to see the connections between operators in Enaction Theory and Type II Enrichment activities. First, Type II Enrichment activities are concerned with mental processes, such as productive thinking, critical thinking,

and decision making. All of these processes are operators on the mental model that developed through encoding experiences like those in Type I Enrichment. Second, Type II activities are concerned with physical processes, such as note taking, library skills, photography, and a variety of information retrieval skills. These physical processes are internally mirrored as operators that change and develop the mental model. The model and set of operators become a source for making assumptions, inferences, and predictions. For Glaser (1984), schema is both model and operator for his definition includes schema as an internal model and as a source of prediction. Even so, his quote is quite applicable. Schema or models and operators "play a central role in thinking and understanding, and the reasoning that occurs takes place in the context of these specific networks of knowledge" (Glaser, 1984, p.100).

Heuristics and Type III Enrichment

Heuristic knowledge, according to Enaction Theory, is the ability to decide which actions and procedures are best in a given situation. Heuristics are rules but they are not algorithms. "An algorithm is a systematic plan that guarantees the solution of a given problem..." (Bolton, 1972, p.168). A heuristic does not guarantee a solution but rather facilitates problem solving by connecting situations, actions, and goals to make thinking more effective. A set of heuristics (rules) becomes a problem solving strategy acting as a guide for thinking. Heuristics are used to select operators to be processed through the mental model.

In the Enrichment Triad Model when students become sincerely interested in specific topics, they are encouraged to conduct a Type III first-hand investigation of a real problem for a real audience. This will not just be a report of already existing material to be hung on the refrigerator. Previous knowledge is a starting point, not an end in Type III investigations. Students must focus upon a problem in their interest area, use the methodology of the field, and present the product to an appropriate audience.

Type III investigations can be the means to developing heuristics. If the goal becomes alerting people to the effects of a polluted tidal pool, then it also becomes the problem. There is not a ready-made algorithm. "For the situation to stimulate thinking, it must... form an obstacle in the way of goal-directed activity" (Bolton, 1972, p.5). For a Type III investigation, the learner brings into play the mental model of the object system and under the guidance of heuristics selects operators related to the problem to run through the model. Simplistically put, the thinking might go as follows, "I need to make an operator selection. Let's see, in Type II training I've learned some problem solving strategies. I'll try those out on my mental model of tidal pool ecology in order to generate some solutions. I've also learned some other Type II skills such as writing, videotaping, and interviewing. Aha! I think I've got a way to begin solving this problem." One of the objectives of Type III Enrichment is to provide an opportunity for students to apply their knowledge and methodological skills to a problem of their own choosing. If one views knowledge as the mental model and methodological skills as operators upon the model, then the solution to the problem could be viewed as a heuristic or set of heuristics. The learner connects the situation (concern for the marine environment) with the goal (to alert the public to the problem) with appropriate actions (focus the problem, use appropriate methodology to gather data, produce a product dealing with the problem, and present it to an audience). (See Figure 1.)

Neither Enaction Theory nor the Enrichment Triad Model are to be thought of as purely linear. Both are interactive. A student might begin with a Type III investigation but then need to go back and gain Type I knowledge and or Type II process skills. The same is true with thinking according to Enaction Theory, one might be given a rule but have to develop a more complete mental model or new operators in order to use it. Since the Enrichment Triad goes beyond thinking into product development, one student's Type III investigation can become another's Type I Enrichment.

Conclusion

Though Enaction Theory is a theory of how humans think, Ohlsson (1983) believes it has educational implications. And indeed, Enaction Theory has been used to develop school curriculum (Hollingsworth, 1985). Ohlsson recommends that students be taught to think or problem solve by teaching them representational, procedural, and heuristic knowledge. It appears that the Enrichment Triad Model does. Triad provides Type I Enrichment to develop the representational mental model. Type II Enrichment is concerned with processes which can act as operators upon the mental model. Triad encourages students to complete Type III investigations, in which students must problem solve. In the light of Enaction Theory, this means that students are developing rules to help them select operators that will help them come to a solution.

Dewey (1933) wrote that reflective thinking impels the thinker to inquire — to find out. It may be that one of the reasons for Triad's success in impelling students to find out is that it is based on a method of reflective thinking and problem solving. To the extent this is true, Enaction Theory seems to be a theoretical validation of the thinking and problem solving aspects of the Enrichment Triad Model.

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